THE FISHES OF ORANGE LAKE, FLORIDA[1]

George K. Reid, Jr.

Despite the great abundance of lakes in Florida, and the varied and interesting lacustrine fish fauna that occurs in the state, no detailed published account of the fishes of a specific lake appears to exist. Harkness and Pierce (1940) presented a list of fishes which occurred in Lake Mize, a small sinkhole lake, and Dickinson (1949) listed the fishes found in some small ponds and ditches in northern Florida. Earlier more general papers on Florida ichthyology include a checklist and bibliography of Florida fishes (Evermann and Kendall, 1899) and a key to freshwater fishes (Carr, 1937). The only annotated faunal accounts of fishes of particular localities or situations are those of Hubbs and Allen (1944), Allen (1946). Herald and Strickland (1949), treating the fauna of two calcareous springs, and that of Goin (1943), which lists the species occurring in the water hyacinth community. A section in Bailey and Hubbs (1949) lists the peninsular endemics. Although the United States Fish and Wildlife Service has recently shown considerable interest in the fisheries resources of Orange Lake, and has just completed an investigation of conditions there, no ichthyological results have been published. It has thus seemed worthwhile to compile an annotated list of the fishes known to inhabit Orange Lake, which is one of the larger of the hundreds of lakes that occur in the central section of peninsular Florida.

Orange Lake is the largest of three major lakes lying within a drainage basin of nearly six hundred square miles in north-central Florida. The basin forms a tributary of the St. Johns River through Orange Creek to the Oklawaha River. Except for the extreme northeastern tip, which lies in Putnam County, all of the lake is within the boundaries of Alachua County. Orange Lake is approximately sixteen miles long and four miles wide at the widest point. Open surface of the lake covers approximately 14,000 acres and this is surrounded by marginal marsh that is nearly a mile wide in places. Subsurface drainage probably contributes considerably to the water volume since surface runoff is mostly confined to River Styx, a small creek at the northwestern end of the lake.

[1]A contribution from the Department of Biology, University of Florida.

The bottom is composed of thick layers of silt and plant detritus over sandy clay and limestone. It slopes from shore to an average maximum, fairly uniform depth of approximately 30-35 feet.

Chemically the water was circum-neutral (pH: 6.8-7.2) during 1947-1948, except in June, 1948, when the pH was 8.2. Surface temperatures varied from 33° C. in June, 1948, to 13.5° C. in January of the same year. Orange Lake water is usually turbid and tinted brownish or greenish by considerable amounts of suspended detritus and its extractives and by the presence of considerable quantity of plankton.

Vegetation in the open water areas consists of sparse growths of submerged *Ceratophyllum demersum* and scattered patches of such emergent plants as *Nymphaea macrophylla* and *Panicum paludivagum*. The littoral zone is marked by marshy areas of submerged vegetation consisting predominantly of *Ceratophyllum demersum*, with lesser stands of *Nais guadalupensis* and *Philotria densa*. The marsh is characterized by thick stands of *N. macrophylla*, *Sagittaria* spp., *Persicaria* sp., *Mariscus jamaicensis*, *P. paludivagum*, and other emergents growing in profusion and intermixed with several species of floating plants such as *Lemna minor*, *Azolla caroliniana*, and, in places, the very abundant water hyacinth, *Piaropus crassipes*. Great mats of hyacinths, and floating islands of compacted plant debris and roots supporting large shrubs and emergent plants (*Persicaria*, *Panicum*, *Sagittaria*, *etc.*) are conspicuous vegetational features of the lake. Invertebrate organisms used by fishes as food are abundant in the littoral vegetation. Crustaceans, such as the scud (*Hyalella azteca*), and shrimp (*Palaemonetes paludosa*), Cladocera, and Copepoda, are especially abundant. Odonata and Diptera larvae are quite plentiful, seasonally, and comprise important items in the diet of many fishes.

This list is an outgrowth of an investigation which was carried on intensively from February, 1947, through May, 1948. In addition, considerable data taken previous and subsequent to that period are at hand.

Collections were made by means of various types of seines and traps, and by hook-and-line fishing; much information was obtained by examination of catches of sport and commercial fishermen.

The common names employed are those given by Carr (*loc. cit.*) except for a few which through continued local usage have seemed preferable.

I am grateful to Dr. Coleman J. Goin for helpful criticisms and assistance during the course of the investigation and preparation of the original manuscript. Appreciation is also expressed to Dr. Archie F. Carr, Jr., for reading the manuscript, and to many friends in the Department of Biology, University of Florida, and at Orange Lake, for aid in many ways. I wish particularly to acknowledge the co-operation of and generous loan of equipment by Mr. Homer J. Klay, Jr., proprietor of Orange Lake Fishing Camp.

Specimens were collected under a permit granted by Mr. John F. Dequine, Chief Fisheries Biologist of the Florida Game and Fresh Water Fish Commission.

List of Fishes

The following list includes thirty-seven species of fishes known to occur in Orange Lake. Two additional forms (*Ictalurus* spp.), although not definitely recorded by the author, probably occur in the lake. It is believed that this represents a nearly complete list of the fishes in the lake.

Lepisosteus platyrhincus De Kay

Florida Spotted Gar

Gars are common in Orange Lake and its tributaries. This species is found more frequently near the shoreline and in the marshes where it feeds on small fishes. It was observed in considerable abundance among hyacinths at the northwest end of the lake. Gravid females are usually noted in early summer.

Amia calva Linnaeus

Bowfin, Mudfish

This species, known locally as mudfish, is common in the lake. Individuals of large size (10-12 pounds) are frequently taken by sport fishermen. Brightly marked young were collected at the upper end of the lake in March, 1947. They were approximately 55 mm. in standard length and were guarded by a somewhat vicious adult.

Signalosa petenensis vanhyningi Weed

Florida Lesser Shad

These forage fish were not observed in Orange Lake until July, 1948. On the basis of my collections, I do not believe them to be overly common in the lake.

Dorosoma cepedianum (LeSueur)

Northern Gizzard Shad

This species appears to be much more common in Orange Lake than the lesser shad. Known locally as "shadine minnow," it occurs frequently in large schools and it forms an important part of the food of bass (McLane, 1949) and crappie (Reid, 1950a) in this vicinity.

Neither *Signalosa* nor *Dorosoma* appears to be hardy. Both die almost instantly upon being taken from the water. In September, 1948, several kinds of fishes were observed in the cove at Orange Lake Fishing Camp. All seemed very weak and were gulping at the surface. Hundreds of dead shad were observed floating on the surface and represented by far the most abundant casualty group.

Examination of stomach contents of shad in Orange Lake revealed their food to consist almost entirely of ostracods, copepods, and cladocerans, with phytoplankton in much lesser quantity.

Erimyzon sucetta sucetta (Lacépède)

Eastern Lake Chub-sucker, Sucker

Suckers attain comparatively large size (350 mm. in standard length) in lakes in this area. They were taken frequently in the chicken-wire traps used for collecting specimens, and appear to be common in the lake.

Notemigonus crysoleucas boscii Valenciennes

Florida Golden Shiner

This species is one of the more common forage fishes in Orange Lake. Shiners are of great importance in this vicinity as bass bait. Hundreds are sold daily during certain seasons by fishing camps. Large size (200-300 mm. in standard length) is attained and they appear to be hardy and resistant. They occur most commonly in the marsh and in patches of *Panicum and Nymphaea.*

Opsopoeodus emiliae Hay

Pug-nosed Minnow

This species is represented in my collections by specimens taken from small sandy areas near the shore and from among the roots of plants on floating islands.

Notropis maculatus (Hay)

Red Minnow

During summer months this species occurs occasionally in large

schools breaking the surface, apparently eluding larger fishes. Individuals acquire brilliant orange-red to red coloration which is doubtless associated with breeding. Although probably common in Orange Lake, "red minnows" are most apparent during breeding season. At other times they are not taken frequently by ordinary collecting methods.

Ictalurus spp.

Although none of these forms was observed by the author, local catfishermen assured me that "channel cats" are taken from Orange Lake. It is quite likely that the channel catfish referred to is *Ictalurus lacustris punctatus*. The white catfish, *Ictalurus catus*, is known to occur in adjacent Lochloosa Lake, which is connected with Orange Lake and it may likewise occur in the latter.

Ameiurus nebulosus marmoratus (Holbrook)

Marbled Brown Bullhead, Speckled Cat

This species was taken quite commonly on "catlines" in the lake. From observations made of the catches of local commercial fishermen, I judge it to be the most common of the catfishes, and rather abundant in the lake.

Ameiurus natalis erebennus Jordan

Yellow Bullhead, Yellowbelly

Yellow Bullheads are abundant in Orange Lake. They were observed in considerable quantities in the catches of local fishermen and constituted a large portion of their take. Young of this species were seen on numerous occasions swimming in compact masses herded by an adult. On May 1, 1947, there appeared to be an upset in the oxygen-carbon dioxide balance in the water in the cove at Orange Lake Fishing Camp. The young catfish, which for a number of days preceding this date had been behaving normally in the school, were scattered and swimming at the surface, gulping. By noon of the same day the water apparently had become normal, for the young catfish had again schooled and were moving below the surface.

Schilbeodes mollis (Hermann)

Tadpole Madtom

This species, the smallest of the local catfishes, occurred commonly in the grassy regions along a causeway across the upper end of the lake, and among the submerged roots of hyacinths and plants

composing floating islands.

Esox niger LeSueur

Chain Pickerel, Jackfish

Although not usually sought after as a food or game fish in this vicinity, this pickerel is taken frequently on casting plug or live bait. It appears to be more abundant in the open water than in the littoral zone.

Esox americanus Gmelin

Bulldog Pickerel

This species is the smaller of the pickerels known to occur in Florida. It was taken commonly while seining in the dense vegetation along the shoreline of the lake.

Anguilla bostoniensis (LeSueur)

American Eel

Eels are taken occasionally on hook-and-line. One individual was captured in a fish trap during the investigation. They are believed to be rather common in the lake.

Chriopeops goodei (Jordan)

Red-finned Killifish

This small cyprinodont was found to be abundant in the marsh and underneath floating islands. *C. goodei* is endemic to peninsular Florida.

Leptolucania ommata (Jordan)

Ocellated Killifish, Target Fish

Target fish do not appear to be as common as the other cyprinodonts. They were taken in the grassy margins, usually in association with *Gambusia affinis holbrookii* and *Heterandria formosa.*

Fundulus chrysotus (Günther)

Golden Topminnow

During the winter months this species is in great demand as bait for black crappie; thousands of topminnows are sold daily. *F. chrysotus* does not appear to be overly abundant in the lake proper, although it was found quite commonly in the swampy areas bordering the lake.

Fundulus dispar lineolatus (Agassiz)

Eastern Star-headed Topminnow

Star-heads were taken rather infrequently as compared with other

cyprinodonts of Orange Lake. They were found occasionally in the swampy portions of the lake and in connecting ditches.

Jordanella floridae Goode and Bean
FLAGFISH

This small, colorful fish was found commonly in the shallow grassy regions of the lake and in roadside ditches which are connected with the lake. It does not seem to be common in the marshy areas of the main body of the lake. This species is restricted to peninsular Florida.

Heterandria formosa (Agassiz)
LEAST KILLIFISH

This small, viviparous form abounds throughout the lake where vegetation is dense. It was found underneath floating islands considerable distances from shore.

Gambusia affinis holbrookii (Girard)
EASTERN MOSQUITO-FISH, POT GUT

This ubiquitous fish is abundant in practically all situations in Orange Lake. It occurs in much the same habitat as *Heterandria formosa.*

Mollienisia latipinna LeSueur
SAILFIN, MOLLY, SULPHUR MINNOW

Sailfins do not appear to be abundant in Orange Lake. They were found more commonly in the roadside ditches and swamps, although a few individuals were taken in the marsh and along the shoreline.

Aphredoderus sayanus (Gilliams)
PIRATE PERCH

This species is found commonly in the marshes and was taken frequently from underneath floating islands and hyacinth mats.

Hololepis barratti (Holbrook)
FLORIDA SWAMP DARTER

This was the only species of darter taken. It appears to be fairly common, although never abundant, in the shallow shore zones and underneath floating islands.

Pomoxis nigro-maculatus (LeSueur)
BLACK CRAPPIE, SPECKLED PERCH

Although black crappie are commonly found in many of the streams and lakes throughout the state, it appears that the lakes of

the central highlands region afford a habitat conducive to maximum growth and abundance. Crappie of 300 mm. in standard length, and weighing nearly three pounds, are not uncommon in this area.

In Orange Lake the habitat preference of the adult crappie during the non-breeding season appears to be open water. During the breeding period, which usually begins in January and continues through April, crappie are most abundant along the outer edges of the marsh, where the redds are placed. A marked sexual dimorphism is particularly conspicuous during the spawning season. The male crappie assumes a much darker appearance through more intense pigmentation, especially on the venter and cheeks.

Food of crappie consists primarily of fishes, amphipods, and insect larvae.

Mesogonistius chaetodon elizabethae Bailey

Black-banded Sunfish

Until January, 1947, this small sunfish had not been found in Orange Lake (Reid, 1950b). At present, only two specimens have been taken. It is believed that this species is rare in the lake proper, although it is common in an adjacent lake to the southward, Hawthorne Prairie, which at previous times was connected with Orange Lake.

Chaenobryttus coronarius (Bartram)

Warmouth

The warmouth appears to be quite common in the lake, especially in the marsh and swamps, and is often found among hyacinth rafts and around floating islands. It is highly esteemed as a panfish.

Enneacanthus obesus (Girard)

Banded Sunfish

Only one specimen of this form has been taken by the author. It is probably rare in this lake. Chable (1947) considers this species to be more characteristic of lotic environments.

Enneacanthus gloriosus (Holbrook)

Blue-spotted Sunfish

This attractive small centrarchid occurs commonly throughout all of the densely vegetated areas of the lake. It was often found under floating islands and in shallow areas along the northwestern end of the lake.

Lepomis macrochirus purpurescens Cope

BLUEGILL, COPPERHEAD, BREAM

Known locally as "brim", this species is probably the most abundant of the panfishes in Orange Lake. During breeding season, usually in late spring and summer, bluegills are taken in tremendous numbers. Catches of forty individuals in a single morning by one fisherman are not uncommon. In years past, this species chose patches of *Nymphaea* for breeding sites and congregated in considerable numbers, the redds in water up to ten or twelve feet deep. Of late, the patches of *Nymphaea* have become sparse, so that present spawning sites are not clearly defined. A coppercolored stripe across the nape of the adult fish, especially actively breeding males, accounts for the name "copperhead".

Food of the bluegill is composed of amphipods, entomostracans, insect larvae, and molluscs.

Lepomis microlophus microlophus (Günther)

SHELL-CRACKER

Although quite common in Orange Lake, this species does not appear to be as abundant as the bluegill. Shell-crackers seem to have much the same habits as bluegills in their choice of spawning sites and food, although breeding during 1946 and 1947 occurred several weeks later than that of bluegills.

Lepomis punctatus punctatus (Cuvier)

STUMP-KNOCKER

These smaller sunfishes do not seem to be abundant in Orange Lake. They were collected occasionally from swampy areas and marsh zones.

Lepomis marginatus (Holbrook)

FLORIDA LONG-EARED SUNFISH

This highly colored and retiring sunfish occurs frequently in the marsh and densely vegetated areas of the lake. Its habitat appears to be similar to that of *Enneacanthus gloriosus.*

Micropterus salmoides floridanus (LeSueur)

FLORIDA LARGE-MOUTHED BASS

Large-mouth bass are common in Orange Lake. Like black crappie, bass appear to find conditions in the lakes in this region highly favorable and they attain great abundance and size. Different color patterns were noted during the investigation. Some of the large indi-

viduals were a light brown or tan, while others were colored with the more characteristic green pattern.

Elassoma zonatum (Jordan)
Banded Pigmy Sunfish

Several specimens of this species were collected at the northwestern end of the lake in the densely vegetated areas near the mouth of River Styx. This record represents an extension of the known range of the form, since it has been known previously only as far south as the Santa Fe River drainage in northern Florida. *E. zonatum* is believed to be comparatively rare in Orange Lake.

Elassoma evergladei Jordan
Everglades Pigmy Sunfish

This species is common among the roots of hyacinths and underneath floating islands. Because of the deep iridescent blue markings of the males, this fish is much sought by local aquarists. Much of its brilliance is soon lost, however, unless dark bottom or background is provided.

Labidesthes sicculus vanhyningi Bean and Reid
Florida Brook Silversides, Glass Minnow

The glass minnow, as this fish is commonly known in this region, seems to be essentially an open water inhabitant. It does not occur as abundantly in the turbid water of Orange Lake as in the clear, sand-bottom lakes of the highlands section of the state.

Literature Cited

ALLEN, E ROSS
1946. Fishes of Silver Springs, Florida. *Published by the author.* 1946: 1-36.

BAILEY, REEVE M., and CARL L. HUBBS
1949. The Black Basses (*Micropterus*) of Florida, with Description of a New Species. *Occ. Papers Mus. Zool. Univ. Mich.*, 516 1-40, Pls.. 1-2.

CARR, ARCHIE F., JR.
1937. A Key to the Fresh-water Fishes of Florida. *Proc. Fla. Acad. Sci.*, 1: 72-86, 1 fig.

CHABLE, ALPHONSE C.
1947. A Study of the Food Habits and Ecological Relationships of the Sunfishes of Northern Florida. (*Unpub. Master's Thesis, Univ. Fla. Library*, 1947).

DICKINSON, J. C., JR.
1949. An Ecological Reconnaissance of the Biota of Some Ponds and Ditches in Northern Florida. *Quart. Jour. Fla. Acad. Sci.* 11(2-3): 1-28, Pls. I-II, Maps 1.

EVERMANN, BARTON W. and WILLIAM C. KENDALL
1899. Check-list of the Fishes of Florida. *Rept. U. S. Comm. Fish and Fisheries for 1899.* (1900: 35-103.

GOIN, COLEMAN J.
1943. The Lower Vertebrate Fauna of the Water Hyacinth Community of Northern Florida. *Proc. Fla. Acad. Sci.* 6(3-4): 143-154.

HARKNESS, W. J. K. and E. LOWE PIERCE
1940. The Limnology of Lake Mize, Florida. *Proc. Fla. Acad. Sci.* 5: 96-116.

HERALD, EARL S. and ROY R. STRICKLAND
1949. An Annotated List of the Fishes of Homosassa Springs, Florida. *Quart. Jour. Fla. Acad. Sci.* 11(4): 99-109.

HUBBS, CARL L. and E. ROSS ALLEN
1944. Fishes of Silver Springs, Florida. *Proc. Fla. Acad. Sci.* 6:110-130, Figs. 1-4.

McLANE, WILLIAM M.
1948. The Seasonal Food of the Largemouth Black Bass, *Micropterus salmoides floridanus* (Lacepede), in the St. Johns River, Welaka, Florida. *Quart. Jour. Fla. Acad. Sci.* 10(4) :103-138.

REID, GEORGE K., JR.
1950a. Food of the Black Crappie, *Pomoxis nigro-maculatus* (LeSueur), in Orange Lake, Florida. *Trans. Amer. Fish. Soc.* In press.
1950b. Notes on the Centrarchid Fish. *Mesogonistius chaetodon elizabethae,* in Peninsular Florida. *Copeia.* In press.